

Storage and Containment of Nuclear Targets for Pulsed Fission-Fusion Testing

Completed Technology Project (2016 - 2017)



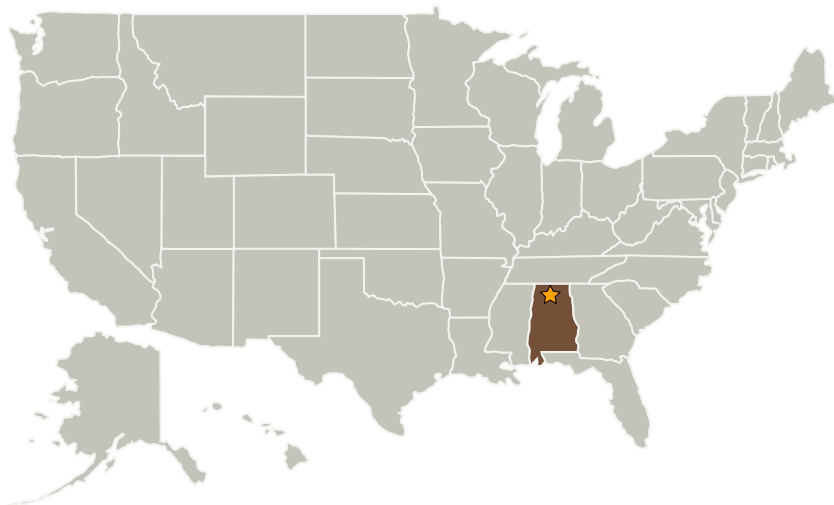
Project Introduction

The combined fission-fusion fuel target is the heart of an engine concept that can open the solar system to fast and efficient human exploration. This is a unique development effort for a high-performance propulsion system concept to enable faster trip times to Mars or other destinations. The current target is a highly enriched uranium shell holding Deuterium and Tritium gas at the critical point with a layer of Li6 outside the Uranium shell. Alternative targets replace the D-T with solid D-Li6. Additionally we wish to investigate the feasibility of operating more in the fast neutron spectrum by running lower enriched Uranium with thicker layers of Lithium. This work is computational only and is necessary to set up the nuclear site license with the NRC. Another part of this CIF will be to design the containment system for these experiments. We will have to develop a chamber capable of containing the blast and a storage unit to move nuclear materials to and from the experimental rig. We will validate the containment system using conventional explosives.

Anticipated Benefits

The proposed work as a continuation of the innovative Pulsed Fission-Fusion (PuFF) Propulsion Concept is required to properly, safely, and legally handle very small nuclear targets needed in the future for PuFF research. The work is necessary to move to the next stage in the PuFF development process and to acquire the necessary licenses. No nuclear material is involved in this CIF.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
★ Marshall Space Flight Center (MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
The Boeing Company (Boeing)	Supporting Organization	Industry	Chicago, Illinois
University of Alabama in Huntsville (UAH)	Supporting Organization	Academia	Huntsville, Alabama

Primary U.S. Work Locations

Alabama

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Center Innovation Fund: MSFC CIF

Project Management

Program Director:

Michael R Lapointe

Program Manager:

John W Dankanich

Principal Investigator:

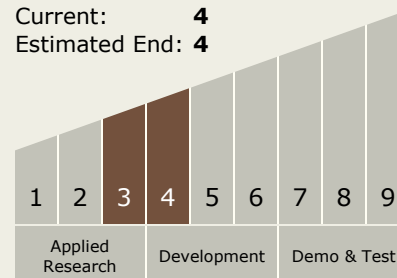
Robert B Adams

Technology Maturity (TRL)

Start: 3

Current: 4

Estimated End: 4



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Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
 - └ TX03.1 Power Generation and Energy Conversion
 - └ TX03.1.6 Other Advanced Concepts for Generating/Converting Power

Target Destinations

Mars, Others Inside the Solar System